

Notice of Allowability

Application No.

10/772,592

Examiner

Shambhavi Patel

Applicant(s)

SLATER, ROBERT D.

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 3/15/07.
2. ☒ The allowed claim(s) is/are 1-3,5,7-48 and 50-64.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

Art Unit: 2128

DETAILED ACTION

1. This Office Action is in response to the Amendment submitted 15 March 2007.
2. Claims 1-3, 5, 7-48, and 50-64 have been presented for examination. Claims 4, 6 and 49 have been cancelled. Claims 57-64 are newly added.

Response to Arguments

3. The 35 U.S.C. 101 and 112 rejections have been withdrawn subsequent to Applicant's and Examiner's Amendment.
4. Applicant's arguments filed 15 March 2007 regarding the 35 U.S.C. 102(b) rejection have been fully considered but they are not persuasive. Applicant submits that Upadhy's model is devoid of any teaching of methods applicable over the 'life cycle' of the weapons system or to stockpile availability. Applicant is directed to **section 2 5th paragraph** of the Upadhy reference, which discloses "age-related failures." Thus, Upadhy considers the life cycle of the weapons system.

Examiner's Amendment

5. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Eric Gifford on 29 March 2007.

Please amend **claim 1** as follows:

1. (Currently Amended) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:
a plurality of dynamic objects having attributes that represent characteristics of weapons, said attributes having local values that define a local state of each dynamic object;

Art Unit: 2128

a plurality of static objects having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic;

a network of said static objects that are organized in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons stockpile and operational availability, maintenance activities, and spare parts stock over a life cycle of the weapons system, said network having a global state; and

a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons stockpile and operational availability, maintenance activities, and spare parts stock as the dynamic objects traverse the network, said DES displaying the results of the simulation including conveying the time-base prediction of weapons availability, maintenance activities and spare parts stock to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

Please amend claim 36 as follows:

36. (Currently amended) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

a plurality of dynamic objects having Birth Date, Time-to-Failure (TTF) variate, Duty Cycle, Warranty Cycle, Down Time, MTBF, BitDetectable, GodsEye and Weapon Variant common attributes that represent characteristics of a weapon, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects including primitive blocks and common blocks having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic, each common block comprising a plurality of primitive blocks and/or other embedded common blocks configured to process the dynamic objects and global data to route the dynamic objects, modify the dynamic objects or perform a statistical or informational calculation for a defined common block function including each of BIT, Stockpile Availability, Observe A₀, Operational Availability, Warranty Check, Set Failure Variates, Service Life Check and Parts Spares;

a network of said primitive and common blocks that are organized in accordance with a service use profile (SUP) that describes a logical structure of delivery, maintenance, deployment and testing policy and infrastructure and logistics constraints to calculate a time-based prediction of stockpile and operational weapons availability, maintenance activities, and spare parts stock over a life cycle of the weapons system, said network having a global state;

a simulation engine that advances to the next change of said local or global states whereat said primitive and common blocks read and write said attributes in accordance with their functional operators and global data and said network updates the time-based predictions as the dynamic objects traverse the network, said DES system displaying the results of the simulation including conveying the time-base prediction of stockpile and operational weapons availability, maintenance activities, and spare parts stock to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

Art Unit: 2128

Please amend **claim 39** as follows:

39. (Currently Amended) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

- a plurality of dynamic objects having attributes that represent characteristics of weapons, said attributes having local values that define a local state of each dynamic object;

- a plurality of static objects including primitive blocks and common blocks having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic, and including a Stockpile Availability common block that calculates a measure A_s of the percentage of weapons in a stockpile that are ready for issue (RFI) as $A_s = \text{RFI} / (\text{Nd} - \text{Att})$ where Nd is the number delivered to the stockpile up to a point in time and Att is the attrition up to a point in time;

- a network of said static objects that are organized in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons stockpile availability over a life cycle of the weapons system, said network having a global state; and

- a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons stockpile availability as the dynamic objects traverse the network, said DES system displaying the results of the simulation including conveying the time-base prediction of weapons stockpile availability to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

Please amend **claim 40** as follows:

40. (Currently Amended) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

- a plurality of dynamic objects having attributes that represent characteristics of weapons including MTBF, Time-to-Failure (TTF) and BitDetectable attributes, said attributes having local values that define a local state of each dynamic object;

- a plurality of static objects including primitive blocks and common blocks having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic, and including a Set Failure Variates common block that uses the MTBF as an input to randomly generate a value for the TTF attribute and randomly generates either a 0 or 1 for the BitDetectable attributes based on an overall test effectiveness probability;

- a network of said static objects that are organized in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons availability over a life cycle of the weapons system, said network having a global state; and

- a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons availability as the dynamic objects traverse the network, said DES system displaying the results of the simulation including conveying the time-base prediction of weapons

Art Unit: 2128

availability to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

Please amend **claim 41** as follows:

41. (Currently Amended) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

a plurality of dynamic objects having attributes that represent characteristics of weapons including Birth Date, MTBF, and TTF attributes, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects including primitive blocks and common blocks having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic, and including a Service Life Check common block that uses the Birth Data and CurrentTime attributes to calculate the age of the dynamic object and compare it to a service life, and if the age is greater than the service life either take the dynamic object out of service or recalculate its MTBF and TTF attributes as a function of its age;

a network of said static objects that are organized in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons availability over a life cycle of the weapons system, said network having a global state; and

a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons availability as the dynamic objects traverse the network, said DES system displaying the results of the simulation including ~~conveying~~ the time-base prediction of weapons availability to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

Please amend **claim 42** as follows:

42. (Currently Amended) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

a plurality of dynamic objects having attributes that represent characteristics of weapons including Birth Date and Down Time attributes, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects including primitive blocks and common blocks having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic, and including an Observe A_0 common block calculating a single point estimate A_{0s} of A_0 as $A_{0s} = 1 - \text{Down Time} / (\text{CurrentTime} - \text{Birth Date})$ where CurrentTime is a current time and a count of the number of observations to date and an Operational Availability common block that calculates a running average A_0 from a plurality of single-point estimates A_{0s} observed at different points in the network weighted by a cumulative number of observations for each estimate;

a network of said static objects that are organized in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons operational availability over a life cycle of the weapons system, said network having a global state; and

Art Unit: 2128

a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons operational availability as the dynamic objects traverse the network, said DES system displaying the results of the simulation including ~~conveying~~ the time-base prediction of weapons operational availability to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

Please amend **claim 43** as follows:

43. (Currently Amended) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

a plurality of dynamic objects having attributes that represent characteristics of weapons including TTF, Duty Cycle and BitDetectable attributes, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects including primitive blocks and common blocks having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic, and including a BIT common block performing a sequence of logical operations on the dynamic object to determine whether a false alarm failure occurs, whether a failure is detectable by the value of the BitDetectable attribute and whether the dynamic object's Duty Cycle is greater or less than its TTF;

a network of said static objects that are organized in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons availability over a life cycle of the weapons system, said network having a global state; and

a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons availability as the dynamic objects traverse the network, said DES system displaying the results of the simulation including ~~conveying~~ the time-base prediction of weapons availability to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

Please amend **claim 45** as follows:

45. (Currently Amended) A method of analyzing an operations and support (O&S) problem of a weapons system, comprising:

creating a model of the O&S problem based on a service use profile (SUP) that describes a logical structure of delivery, maintenance, deployment and testing policy and infrastructure and logistics constraints;

translating the model into a discrete even simulation in which dynamic objects flow through a network of static objects that are organized in accordance with the model, said dynamic objects having common attributes with local values and said static objects having data that is global with respect to the dynamic objects and functional operators at least some of which are probabilistic;

executing the discrete event simulation by advancing to a next state whereat said static objects read and write said common attributes in accordance with their functional operators and global data and said simulation updates a time-based prediction of weapons

Art Unit: 2128

stockpile and operational availability, maintenance activities, and spare parts stock over a life cycle of the weapons system;

~~conveying~~ displaying the results of the simulation including the time-base prediction of weapons stockpile and operational availability, maintenance activities, and spare parts stock to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

Please amend claim 51 as follows:

51. (Currently Amended) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a Exoatmospheric Kill Vehicles (EKV) program, said DES system comprising:

a plurality of dynamic objects having attributes that represent characteristics of EKVS, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic;

a network of said static objects that are organized in three hierarchical blocks Delivery, Repair & Deployment; Silo Storage and Periodic Test; and Maintenance Returns in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons availability over a life cycle of the EKV program to (1) decide between two competing maintenance concepts A and B for the program; (2) quantify repairs of EKV payloads; and (3) identify major spares requirements for EKV payloads return, said network having a global state; and

a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons availability as the dynamic objects traverse the network., said DES displaying the results of the simulation including ~~conveying~~ the time-base prediction of weapons availability, maintenance activities and spare parts stock to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

Allowable Subject Matter

6. Claims 1-3, 5, 7-48, and 50-64 are allowed. The following is an examiner's statement of reasons for allowance:

The Examiner notes the following interpretations (based on the Applicant's disclosure) of the following terms:

- i. BIT: [0153] – [0166]
- ii. Warranty Check: [0171] – [0178]

Art Unit: 2128

- iii. Stockpile Availability: [0093] – [0105]
- iv. Set Failure Variates: [0107] – [0119]
- v. Service Life Check: [0120] – [0130]
- vi. Observe A_0 : [0132] – [0140]
- vii. Operational Availability: [0142] – [0151]
- viii. Parts Spares: [0182] – [0195]
- ix. BitDetectable: [0075]
- x. MTBF: [0074]
- xi. TTF: [0070]
- xii. Birth Date: [0069]
- xiii. Down Time: [0073]
- xiv. Duty Cycle: [0071]
- xv. Delivery, Repair, & Deployment block: **figure 24**
- xvi. Silo Storage and Periodic Test block: **figure 25**
- xvii. Maintenance Return block: **figure 26**

Regarding claim 1:

The prior art of record does not disclose a “time-based prediction of weapons stockpile and operational availability, maintenance activities, and spare parts stocks”. The Examiner notes the interpretation of the terms “Stockpile Availability,” “Operational Availability” and “Parts Spares” above.

Dependent claims 2, 3, 5, 7-35, and 57 are deemed allowable as depending from independent claim 1.

Art Unit: 2128

Regarding claim 36:

The prior art of record does not disclose a “defined common block function including each of BIT, Stockpile Availability, Observe A₀, Operational Availability, Warranty Check, Set Failure Variates, Service Life Check, and Parts Spares,” and a “time-based prediction of weapons stockpile and operational availability, maintenance activities, and spare parts stocks”. The Examiner notes the interpretation of the terms “BIT”, “Observe A₀,” “Warranty Check,” “Set Failure Variates,” “Service Life Check,” “Stockpile Availability,” “Operational Availability” and “Parts Spares” above.

Dependent claims 37-38 are deemed allowable as depending from independent claim 36.

Regarding claim 39:

Please see the Examiner’s statement of Reasons for Allowance presented in the previous Office Action.

Regarding claim 40:

Please see the Examiner’s statement of Reasons for Allowance presented in the previous Office Action.

Regarding claim 41:

Please see the Examiner’s statement of Reasons for Allowance presented in the previous Office Action.

Regarding claim 42:

The prior art of record does not teach dynamic objects that include both BirthDate and Down

Art Unit: 2128

Time attributes, and static blocks that include "Observe A_0 , common block calculating a single point estimate A_0s of A_0 as $A_0s = 1 - \text{Down Time} / (\text{CurrentTime} - \text{Birth Date})$ where CurrentTime is a current time and a count of the number of observations to date, and an Operational Availability common block that calculates a running average Observe A_0 from a plurality of single-point estimates A_0s observed at different points in the network weighted by a cumulative number of observations for each estimate". **The Examiner notes the interpretation of the terms "Observe A_0 ", "BirthDate" "Down Time" and "Operational Availability" above.**

Regarding claim 43:

Please see the Examiner's statement of Reasons for Allowance presented in the previous Office Action.

Dependent claim 44 is deemed allowable as depending from independent claim 43.

Regarding claim 45:

The prior art of record does not disclose a "time-based prediction of weapons stockpile and operational availability, maintenance activities, and spare parts stocks". The Examiner notes the interpretation of the terms "Stockpile Availability," "Operational Availability" and "Parts Spares" above.

Dependent claims 46-48, 50 and 58-64 are deemed allowable as depending from independent claim 45.

Regarding claim 51:

The prior art of record does not disclose:

- i. a network of objects that are organized in three hierarchical blocks Delivery, Repair

Art Unit: 2128

& Deployment; Silo Storage and Periodic Test; and Maintenance Returns in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons availability over a life cycle of the EKV program to (1) decide between two competing maintenance concepts A and B for the program; (2) quantify repairs of EKV payloads; and (3) identify major spares requirements for EKV payloads return, said network having a global state. Though the prior art teaches the preceding steps (2) and (3), the claim requires that all three steps be executed.

- ii. a “time-based prediction of weapons stockpile and operational availability, maintenance activities, and spare parts stocks”

The Examiner notes the interpretation of the terms “Delivery, Repair & Deployment block”, “Silo Storage and Periodic Test block”, “Maintenance Returns block”, “Stockpile Availability,” “Operational Availability” and “Parts Spares” above.

Dependent claims 52-56 are deemed allowable as depending from independent claim 55.

Art Unit: 2128


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shambhavi Patel whose telephone number is 571 272 5877. The examiner can normally be reached on 7:30 am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571)272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Shambhavi Patel Examiner Art Unit 2128


KAMINI SHAH
SUPERVISORY PATENT EXAMINER